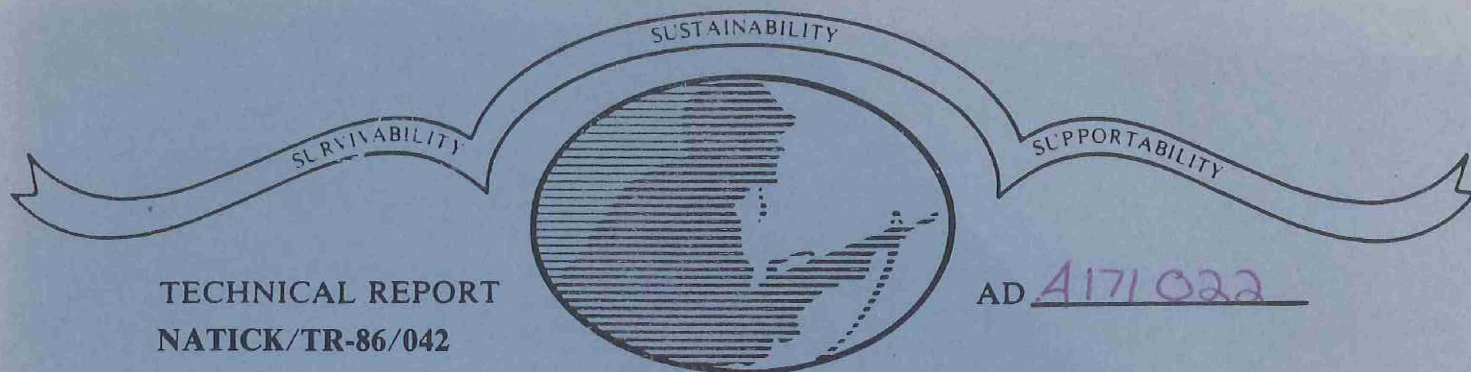




EVALUATION OF THE RATION, COLD WEATHER, BY NAVY SEALS, 1984

by

**A. C. MASTROMARINO
AND
V. A. LOVERIDGE**

**JULY 1986
FINAL REPORT**

**APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED**

**UNITED STATES ARMY NATICK
RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
NATICK, MASSACHUSETTS 01760-5000**

FOOD ENGINEERING DIRECTORATE

Disclaimers

The findings contained in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

Citation of trade names in this report does not constitute an official endorsement or approval of the use of such items.

DESTRUCTION NOTICE

For classified documents, follow the procedures in DoD 5200.1-R, Chapter IX or DoD 5220.22-M, "Industrial Security Manual," paragraph 19. For unclassified documents, destroy by any method which precludes reconstruction of the document.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No 0704-0188 Exp Date Jun 30 1986	
1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b RESTRICTIVE MARKINGS		
2a SECURITY CLASSIFICATION AUTHORITY			3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release - distribution unlimited		
2b DECLASSIFICATION/DOWNGRADING SCHEDULE					
4 PERFORMING ORGANIZATION REPORT NUMBER(S) NATICK/TR-86/042			5 MONITORING ORGANIZATION REPORT NUMBER(S)		
6a NAME OF PERFORMING ORGANIZATION US Army Natick Research, Development, & Engineering Center		6b OFFICE SYMBOL (if applicable) STRNC-WTP		7a NAME OF MONITORING ORGANIZATION	
6c ADDRESS (City, State, and ZIP Code) Natick, MA 01760-5018		7b. ADDRESS (City, State, and ZIP Code)			
8a NAME OF FUNDING/SPONSORING ORGANIZATION		8b OFFICE SYMBOL (if applicable)		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS			
		PROGRAM ELEMENT NO. IL162724AH99	PROJECT NO BB-136	TASK NO 06	WORK UNIT ACCESSION NO
11 TITLE (Include Security Classification) EVALUATION OF THE RATION, COLD WEATHER, BY NAVY SEALS, 1984					
12 PERSONAL AUTHOR(S) A.C. Mastromarino, V.A. Loveridge					
13a TYPE OF REPORT Final		13b TIME COVERED FROM 2/84 TO 7/84		14 DATE OF REPORT (Year, Month, Day) 1986 July	
15 PAGE COUNT 38					
16 SUPPLEMENTARY NOTATION					
17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	RATIONS BODY FLUIDS DEHYDRATED FOODS		
			ARCTIC REGIONS FREEZE DRIED FOODS CONSUMPTION		
			COLD WEATHER ENTREE WATER		
19 ABSTRACT (Continue on reverse if necessary and identify by block number) Cold weather field evaluations of the prototype Ration, Cold Weather (Arctic Ration) were conducted during 1984 winter warfare training using personnel from SEAL Team TWO, Naval Amphibious Base, Norfolk, Virginia. These evaluations assessed the acceptability and consumption of the Ration as well as water availability by means of questionnaires. All personnel were limited to carrying and consuming solely the Ration. Results showed that in general the Ration, Cold Weather meal was acceptable to the men; however, they were dissatisfied with variety between menus. Having received favorable rankings in convenience and quality, the Ration was considered an improvement over other field rations. In addition, water availability was high, resulting in sufficient water intake. High availability appeared to be due to the presence of water discipline.					
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS			21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a NAME OF RESPONSIBLE INDIVIDUAL Arvilla C. Mastromarino			22b TELEPHONE (Include Area Code) 617-651-4050		22c OFFICE SYMBOL STRNC-WTP

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted
All other editions are obsolete

1

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

PREFACE

This project was completed at the U. S. Army Natick Research, Development and Engineering Center (NRDEC) and at the Naval Amphibious Base in Norfolk, Virginia at the request of the Commander, Navy Special Warfare Group Two. These efforts were coordinated through the Food Engineering Directorate of the NRDEC under project number IL162724AH99.

The authors wish to extend great thanks to GMT 1 Douglas Young of the Naval SEAL Team TWO for his assistance and efforts in data collection (see Appendix B), evaluation summary, and recommendations. We would also like to thank the members of SEAL Team TWO who were on the field evaluations for their responses.

A-1



TABLE OF CONTENTS

PREFACE	iii
LIST OF TABLES	vi
INTRODUCTION	1
MATERIALS AND METHODS	2
RESULTS AND DISCUSSION	3
Acceptability	3
Consumption	5
Satisfaction	5
Convenience and Quality	7
Water Availability	9
CONCLUSIONS	11
ADDENDUM	12
REFERENCES	13
BIBLIOGRAPHY	14
APPENDICES	15
Appendix A Ration, Cold Weather Menus	15
Appendix B Young's Questionnaires	23
Individual Item Evaluation.	24
Evaluation Sheet, Arctic Ration	25
Appendix C Ration, Cold Weather Questionnaire	27

LIST OF TABLES

TABLE 1.	Meal Acceptability, Mean Ratings	3
TABLE 2.	Component Acceptability, Mean Ratings	4
TABLE 3.	Frequency of Eating Times	5
TABLE 4.	Presence of Hunger	5
TABLE 5.	Food Amount Satisfaction, Mean Ratings	6
TABLE 6.	Variety Satisfaction, Mean Ratings	6
TABLE 7.	Attribute Satisfaction, Mean Ratings	7
TABLE 8.	Convenience and Quality, Mean Ratings	8
TABLE 9.	Proposed Ration Improvements, Rankings	8
TABLE 10.	Common Submitted Comments	9
TABLE 11.	Water Availability, Mean Ratings	10
TABLE 12.	Frequency of Melting Snow	10
TABLE 13.	Type of Snow Melting Containers	10

EVALUATION OF THE RATION, COLD WEATHER, BY NAVY SEALS, 1984

INTRODUCTION

The Marine Corps requirement for the Ration, Cold Weather (RCW) was established in January 1983 to provide more suitable rations for extreme cold weather conditions. The need was recognized by the Marines during their annual deployment to Norway to participate in the NATO Winter Exercises. Requirements for a RCW were developed based on the Marine Corps' experience through testing of earlier prototypes.^{1,2,3}

Known formerly as the Arctic Ration, the prototype RCW used in this report's evaluations provided 4500 kilocalories contained in two, flat, flexible, waterproof packages, and was lighter and smaller than four Meal, Ready-To-Eat, Individuals (MRE). Each of the six menus contained breakfast items, entrees, snacks, and numerous hot drink mixes; all of which did not freeze and contained approximately 50% less sodium than four MRE's (see Appendix A).

The purpose of these field evaluations was to evaluate informally the use of the RCW under both extreme and mild winter environments in the following areas:

1. Acceptability
2. Consumption
3. Satisfaction
4. Convenience and Quality
5. Water Availability.

MATERIALS AND METHODS

Two cold weather consumer acceptance evaluations of the prototype RCW were conducted in 1984 during winter warfare training using personnel from SEAL Team TWO, Naval Amphibious Base, Norfolk, Virginia. The first trial was conducted during three training periods held between 6-28 February in Goose Bay, Labrador, Canada. The second was conducted between 1-20 July in the Harding ice fields near Seward, Alaska. The men involved had been in the Navy for an average of eight years and three months.

All personnel were limited to carrying and consuming solely the RCW. During the February field evaluation a number of the men completed forms developed by GMT 1 Douglas Young (Appendix B). Following both evaluations, the men completed a general questionnaire on the RCW (Appendix C).

The men were engaged in the following activities while carrying loaded packs (55-75 pounds in Canada and 75-90 pounds in Alaska) during the trial periods:

1. Exercise Hunter's Moon, 6 February. A five kilometer ski and one night in improvised shelters (snow caves).
2. Exercise Highland Stroller, 13-16 February. A nighttime ski exercise covering 70 kilometers over three nights.
3. Exercise Quantum Leap, 21-28 February. Seven nights in the field where 70 kilometers were covered in three nighttime movements.
4. Harding Ice Field, 1-20 July. A daylight ski exercise in undulating terrain, covering 70 kilometers in eight days.

The weather varied from extreme to mild winter conditions. The coldest recorded temperature for the February exercises was -32.1°C on 10 February with the wind at 37 KM/H, giving a windchill factor of -67°C. The average temperatures for Exercise Hunter's Moon, Exercise Highland Stroller, and Exercise Quantum Leap were -19.4°C, -9.8°C, and -12.4°C, respectively. The coldest recorded temperature for the July exercises was -4°C on 13 July, with the warmest being 26°C on 15 July.

RESULTS AND DISCUSSION

Acceptability

The data from both evaluations indicated that the RCW meal was acceptable, as each meal received a mean ranking of greater than or equal to 5.0. Both Breakfast and Dinner were "liked moderately", while Lunch was "liked somewhat". The lower ranking of the Lunch meal could be because that particular meal was not as well defined as Breakfast and Dinner (Table 1).

In general, the RCW components were also acceptable with the exception of the Granola Bar on the Alaska test (Table 2). The rankings ranged from a hedonic ranking of 5.1 (Granola Bar) to 8.5 (Fig Bar) for the Canadian test and from 4.8 (Granola Bar) to 8.5 (Fig Bar) on the Alaskan test. In both evaluations, the lowest ranking components were the Granola Bar, Chocolate Bar with Toffee, and the Orange Beverage Bar.

As a group, the Breakfast items scored the highest. The Entrees were "liked moderately", with the exceptions of the Beef and Vegetable and Escalloped Potato and Pork entrees, which were "liked slightly". Spaghetti received the highest score. The Snacks were all acceptable, with the exception of the Granola Bar mentioned previously. The top three items for each test were the Fig Bar, Raisinut Crunch, and Oatmeal Cookie Bar. The least favorite items were the Chocolate Bar with Toffee, and the Granola Bar. The Drinks were all acceptable with the Orange Beverage Bar scoring the lowest.

Table 1. Meal Acceptability, Mean Ratings
(7 point scale, 1=Dislike Very Much, 7=Like Very Much)

	CANADA			ALASKA		
	N	<u>X</u>	SD	N	<u>X</u>	SD*
Breakfast	21	6.4	1.1	16	6.6	0.6
Lunch	17	5.0	1.2	16	5.9	0.8
Dinner	20	6.2	0.8	16	6.1	0.8

*N= Number of Responses, X=Mean, SD=Standard Deviation

Table 2. Component Acceptability, Mean Rankings
(9 point scale, 1=Dislike Extremely, 9=Like Extremely)

	CANADA			ALASKA		
	N	<u>X</u>	SD	N	<u>X</u>	SD
<u>BREAKFAST</u>						
Maple and Brown Sugar Oatmeal	20	8.2	1.2	16	7.9	1.3
Apple and Cinnamon Oatmeal	20	8.2	1.1	16	8.1	1.2
<u>ENTREES</u>						
Chicken Stew	20	7.1	1.2	16	6.3	1.9
Beef and Vegetables	18	5.9	2.2	15	5.9	2.1
Escalloped Potato and Pork	19	6.5	1.5	16	5.5	2.4
Chicken A La King	19	7.1	1.0	16	7.1	1.9
Chicken and Rice	20	7.0	1.9	16	6.6	2.1
Spaghetti	20	7.1	2.0	16	8.2	0.8
<u>SNACKS</u>						
Orange Nut Cake	20	6.5	2.2	14	6.1	2.1
Raisinut Crunch	19	7.7	1.7	16	7.6	1.4
Chocolate Bar with Toffee	20	5.4	2.3	15	5.4	1.6
Oatmeal Cookie Bar	20	7.5	1.7	16	7.1	2.1
Granola Bar	20	5.1	2.9	13	4.8	2.9
Caramels	20	5.5	1.6	16	6.9	1.3
Fig Bar	20	8.5	0.8	15	8.5	0.7
Brownie	20	6.8	1.5	16	6.4	1.8
<u>DRINKS</u>						
Cocoa	19	7.8	1.1	16	7.2	1.6
Orange Beverage Bar	20	5.6	1.8	15	5.9	1.8
Raspberry Fruit Soup	19	6.3	2.4	14	6.3	2.2
Strawberry Fruit Soup ⁺	-	-	-	14	6.5	2.4
Apricot Fruit Soup ⁺	-	-	-	14	6.3	2.0
Lemon Tea	20	7.4	1.4	15	7.6	1.3
Chicken Noodle Soup	19	7.7	1.1	16	8.3	0.8

⁺ Items not included on Canadian questionnaire.

Consumption

According to Table 3, most of the men consumed the ration not only at designated meal times, but also throughout the day as time permitted (76.2 percent in the Canadian and 63 percent in the Alaskan test). The remainder ate throughout the day with the 6 percent exception on the Alaskan test. The majority (85.7 percent from Canada and 100 percent from Alaska) indicated they had received enough to eat (Table 4). According to GMT 1 Douglas Young, personnel consumed more of their total ration in the Alaskan test than in the Canadian due to boredom and an increase in leisure time resulting from inclement weather.

Table 3. Frequency of Eating Times (%)

	CANADA (N=21)	ALASKA (N=16)
At Designated Meal Times	0	6
Throughout the Day as Time Permitted	23.8	31
Both of the Above	76.2	63

Table 4. Presence of Hunger (%)

	CANADA (N=21)	ALASKA (N=16)
Got Enough to Eat	85.7	100
Was Often Hungry	14.3	0

Satisfaction

Although the men had indicated that they had received enough to eat (Table 5), they also commented that they would like to see increased portion sizes primarily in the oatmeals and secondly in the entrees. Beverages and Soups received "amount just right" ratings, while Candies and Cakes received "amount somewhat too large" ratings.

Table 5. Food Amount Satisfaction, Mean Ratings
(7 point scale, 1=Amount Much Too Small, 7=Amount Much Too Large)

	CANADA (N=21)		ALASKA (N=16)	
	<u>X</u>	SD	<u>X</u>	SD
Entree Bars	3.8	1.3	3.8	0.5
Breakfast	2.7	1.0	3.5	1.1
Candies and Cakes	4.8	1.4	4.5	0.9
Beverages and Soups	4.0	0.7	3.1	1.2

In general, the men felt that variety "should be somewhat more" with the greatest satisfaction being in the breakfast variety (Table 6).

Table 6. Variety Satisfaction, Mean Ratings
(4 point scale)
(1=Variety Enough Now, 4=Should Be Much More Variety)

	CANADA (N=21)		ALASKA (N=16)	
	<u>X</u>	SD	<u>X</u>	SD
Entrees	2.4	0.9	2.4	1.0
Breakfast	1.7	0.9	2.4	1.0
Candies and Cakes	2.2	1.0	2.0	1.1
Beverages and Soups	2.3	1.0	2.6	1.1

Table 7 summarizes the ratings for satisfaction in the RCW's various attributes. Ease of preparation received a "somewhat" to "moderately satisfied" rating. Although taste received the same rating, a few men indicated that the addition of a spice packet would be desirable. Food appearance received a neutral rating of "neither satisfied nor dissatisfied". This could be due in part to the manner of food preparation. According to the men's comments, it appeared that in rehydrating the entree they crumbled the bars so finely that "mush" resulted. Quantity received a "somewhat satisfied" rating. This was reflected in the number of comments suggesting increases in oatmeal, entree, raisinut crunch,

fig bar, and soup portions. Variety within the meal package also received a "somewhat satisfied" rating. Although variety between meal packages received a neutral rating, a few submitted comments indicated that the men would like to see more variety in candy, chocolate bars, soups, and cakes.

Table 7. Attribute Satisfaction, Mean Ratings
(7 point scale, 1=Very Dissatisfied, 7=Very Satisfied)

	CANADA (N=21)		ALASKA (N=16)	
	<u>X</u>	SD	<u>X</u>	SD
Ease of Preparation	5.8	1.4	6.3	0.6
Taste	5.5	0.9	6.0	0.7
Appearance	4.6	1.0	5.2	1.1
Quantity	5.2	1.3	5.9	0.9
Variety within a Menu	5.2	1.7	5.2	1.5
Variety between Menus	4.0	1.4	4.7	1.1

Convenience and Quality

Overall the RCW received favorable rankings in convenience and quality (Table 8). As the MRE was not as readily available as the MCI when the questionnaire was developed in 1981, the men were asked to compare the RCW to the MCI. The ration itself was rated moderately convenient. When compared to the Meal Combat Individual (MCI), the RCW was ranked "somewhat more" in both quality and convenience. A few men from the Canadian evaluation commented that the RCW was a great improvement over other field rations, such as the MCI and the Long Range Patrol rations (LRP).

Table 8. Convenience and Quality, Mean Ratings

	CANADA			ALASKA		
	N	<u>X</u>	SD	N	<u>X</u>	SD
Overall Convenience of RCW (7 point scale, 1=Extremely Convenient, 7=Extremely Inconvenient)	20	2.9	1.4	16	2.2	0.8
Convenience - RCW vs. MCI (7 point scale, 1=Much More, 7=Much Less)	17	2.3	1.5	13	2.0	1.1
Quality - RCW vs. MCI (7 point scale, 1=Much More, 7=Much Less)	16	2.1	1.0	13	2.0	1.2

The Canadian and Alaskan evaluations (Table 9) differed in the ranking of possible improvements. The Canadian test subjects felt that the most important improvement would be to include more breakfast foods, followed by increased variety in the ration, larger portion sizes, improved taste, and lastly, easier preparation. The Alaskan subjects felt that more variety was most important, followed by improved taste, more breakfast foods, easier preparation, and lastly, larger portion sizes.

Table 9. Proposed Ration Improvements, Rankings
(5 point scale, 1=Most Important, 5=Fifth Important)

	CANADA			ALASKA		
	N	<u>X</u>	SD	N	<u>X</u>	SD
Improve Taste	19	3.1	1.4	14	2.4	1.3
Increase Variety	21	2.7	1.4	14	2.0	0.9
Easier Preparation	21	3.5	1.4	14	3.8	0.9
Include More Breakfast Foods	21	2.5	1.2	15	2.4	1.4
Increase Portion Sizes	21	3.0	1.6	15	4.1	1.2

Table 10 summarizes comments common to both evaluations. Most have been mentioned previously in this report. Other comments were limited to a specific evaluation. Canadian subjects' comments dealt primarily with preparation. They indicated the

entree bars were harder to crumble when cold (6 percent), the caramels were too difficult to unwrap (9 percent), the amount of packaging was in excess (7 percent), and the Orange Beverage Bar did not rehydrate properly. One subject increased variety by mixing foods, ie. the fruit soup with the oatmeal.

Table 10. Common Submitted Comments (%)

	CANADA (N=69)	ALASKA (N=29)
Increase Oatmeal	7	3
Granola Bar Unacceptable	6	10
Too Much Candy	3	7
Add a Spice Packet	6	3
Increase Hot Drinks	3	7
Increase Main Meal	3	3
Increase Candy Variety	6	7
Add Fruit	4	3
Increase Soup Portions and Variety	3	13

The subjects' comments from the Alaskan evaluation concerned primarily acceptance. They indicated that they would like to see more oatmeal cookies (3 percent), more ready-to-eat items (3 percent), and more variety in beverage bar flavors (7 percent). Two comments (7 percent) suggested deleting the fruit soups from the ration.

Water Availability

According to Tables 11-13, water was readily available, and water discipline was practiced. The men were "always" able to obtain sufficient water for rehydration. In addition, the men "almost always" had enough water to satisfy their thirst. An indication of the presence of water discipline can be found in the average amounts of water used per day, despite the suggestion that water was only "slightly easy" to obtain. The men used an average of 3.3 canteens (3 liters) or 6.6 to 6.8 canteen cups (approximately 3.2 liters) of water per day. This amount compared satisfactorily to the 3.0 to 3.5 liters recommended for

cold weather intake⁴. Other evidence of organized water management can be seen in the fact that the men melted water two to three times daily in larger vessels than a canteen cup. This reflected the high degree of training present in the specially organized and educated Navy SEALs. As a result, dehydration, so often present in arctic situations, was absent.

Table 11. Water Availability, Mean Ratings

	CANADA			ALASKA		
	N	<u>X</u>	SD	N	<u>X</u>	SD
Sufficient Water to Rehydrate (7 point scale, 1=Always, 7=Never)	21	1.2	0.7	16	1.9	1.0
Ability to Satisfy Thirst (7 point scale, 1=Always, 7=Never)	21	1.8	1.4	16	2.1	1.2
Difficulty in Obtaining Water (7 point scale, 1=Very Easy, 7=Very Difficult)	21	3.0	1.7	16	2.9	1.6
Number of Canteens Used/Day	22	3.3	1.2	16	3.3	1.2
Number of Canteen Cups Used/Day	22	6.6	2.2	16	6.8	2.5

Table 12. Frequency of Melting Snow
(7 point scale, 4=Twice Each Day, 5=Three Times Each Day)

	CANADA			ALASKA		
	N	<u>X</u>	SD	N	<u>X</u>	SD
Number of Times Melted Snow or Ice	21	4.8	1.6	16	4.2	1.2

Table 13. Type of Snow Melting Containers (%)

	CANADA (N=21)	ALASKA (N=16)
Canteen Cup	0	12
Larger Vessel	100	88
Didn't Melt	0	0

CONCLUSIONS

The following can be concluded based on these field evaluations:

1. Both the RCW ration and its components were generally acceptable to the test subjects, with the exception of the Granola Bar.
2. Although 85-100% of the men had received enough to eat, many also desired increased portion sizes in primarily the breakfast items and secondarily in the entrees.
3. Overall, the men were satisfied with ease of preparation, taste, appearance, quantity, and variety within the ration; however, they were dissatisfied with variety between ration menus.
4. The RCW received favorable rankings in convenience and quality and was considered an improvement over other field rations, such as the MCI and the LRP.
5. Water availability was high, resulting in sufficient water intake (an average 3.0-3.2 liters where 3.0-3.5 liters are recommended).

This document reports research undertaken at the US Army Natick Research, Development and Engineering Center and has been assigned No. NATICK/TR-86/042 in the series of reports approved for publication.

ADDENDUM

The following adjustments have been made since this field test⁵:

1. The caramel candies were dropped from the ration due to the difficulty that the men experienced in opening the packages in cold environments.
2. The granola has been reformulated for improvements in flavor and texture.

REFERENCES

¹Wyant, K. W., Wilkinson, W. C., Meiselman, H. L., Symington, L. E., and Hunn, J. G., Performance, Physiological, and Acceptance Tests of a 1500-Kcal Emergency/Assault Food Packet Diet in a Cold Weather Environment, USANR&DL NATICK/TR-81/002, November 1980.

²Jacey, M. J., Heyder, E., and Tappan, D. V., Menu Item Preferences of the Marine Corps Arctic Ration (Prototype): A Controlled Study, NavSubMedRsch Lab Memorandum Report No. 81-2, 22 December 1981.

³Wyant, K. W. and Caron, P. L., The Emergency/Assault Food Packet with the Arctic Supplement--an Evaluation of an Arctic Ration and Assessment of Water Discipline, USANR&DL NATICK/TR-83/002, December 1981 (AD A128 380).

⁴Tappan, D. V., Jacey, M. J., and Heyder, E., Fluid Requirements in Military Personnel Working in Cold Environments and Receiving Arctic/Assault Rations Containing High Salt Levels, NavSubMedRsch Lab Report 968, February 1982.

⁵Mastromarino, A. C., and Loveridge, V. A. Evaluation of the Ration, Cold Weather April 1985, USANRD&EC Technical Report, NATICK/TR-86/027, June 1986.

BIBLIOGRAPHY

Hirsh, E., Acceptability and Consumption of Arctic Ration, Draft Technical Report, USANR&DL, 1984.

Jacey, M. J., Wojtowicz, J. J., Tappan, D. V., Heyder, E., and Gray, P. H., Acceptance of Menu Items in the Low-Salt U. S. Marine Corps Arctic Ration (Prototype), NavSubMedRschLab Report No. 1017, 16 February 1984

APPENDIX A
Ration, Cold Weather Menus

APPENDIX A

RATION, COLD WEATHER MENU 1

#1 Meal Pack	Calories	Protein (g)	CHO (g)	Fat (g)	Water (g)	Sodium (mg)	Wt. of Indiv. Item (g)	No. of Items	No. of Packets	Total Wt. (g)
Chicken Stew Bars	528	34.4	54.4	19.3	0.9	2693	30	4	1	120
Oatmeal (Apple & Cin.)	348	8.0	55.8	5.3	6.0	471	96	1	1	96
Granola Bars	396	9.6	56.4	14.8	1.8	180	43	2	1	86
Oatmeal Cookie Bars	464	9.4	64.2	19.0	5.4	384	50	2	1	100
Orange Nut Cake	375	3.8	54.2	15.9	14.8	313	90	1	1	90
Nut & Raisin Mix	564	11.9	66.5	27.8	1.7	404	56	2	2	112
Fig Bars	206	2.3	41.2	3.7	9.9	256	29	2	1	58
Chocolate Bars	263	7.1	36.6	14.2	0.9	128	28	2	1	56
Caramels	273	3.9	52.2	5.5	5.2	180	11	6	1	68
Orange Beverage Bars	222	0.4	54.6	0.4	0.1	26	28	2	1	56
Cocoa Beverage	380	6.0	35.5	11.1	1.9	276	43	2	2	86
Lemon Tea	90	-	22.5	-	-	-	14	2	2	28
Fruit Soup	190	-	47.5	-	1.8	36	50	1	1	50
Soup, Chicken Noodle	77	1.6	9.8	2.6	0.8	637	18	1	1	18
	4376	100.4	651.4	139.6	51.2	5123			18	1024
Coffee, Cream, Sugar & Chewing Gum	60									
	4436									
RATION SUMMARY:										
Menu #1	4436	100.4	651.4	139.6						5123
#2	4415	119.9	618.6	141.8						4766
#3	4431	101.6	626.5	147.6						5027
#4	4529	116.9	619.9	156.6						5437
#5	4504	100.4	613.8	148.2						5677
#6	4450	105.5	627.3	147.6						3710
$\bar{x}$	4461	107.5	629.6	146.9						4957

APPENDIX A

RATION, COLD WEATHER MENU 2

#2	Meal Pack	Calories	Protein (g)	CHO (g)	Fat (g)	Water (g)	Sodium (mg)	Wt. of Indiv. Item(g)	No. of Items	No. of Packets	Total Wt.(g)
	Beef & Vegetable Bars	552	52.8	39.6	20.9	1.3	2380	30	4	1	120
	Oatmeal (Maple & Br. Sugar)	408	10.0	64.5	5.3	(9.0)	593	101	1	1	101
	Granola Bars	196	9.6	56.4	14.8	1.8	180	43	2	1	86
	Oatmeal Cookie Bars	464	9.4	64.2	19.0	5.4	384	50	2	1	100
	Brownie	270	2.9	27.5	16.5	2.6	69	50	1	1	50
	Nut & Raisin Mix	5.4	11.9	66.5	27.8	1.7	404	56	2	2	112
	Fig Bars	206	2.3	41.2	3.7	9.9	256	29	2	1	58
	Chocolate Bars	263	7.1	36.6	14.2	0.9	128	28	2	1	56
	Caramels	273	3.9	52.2	5.5	5.2	180	11	6	1	68
	Orange Beverage Bars	222	0.4	54.6	0.4	0.1	26	28	2	1	56
	Cocoa Beverage	380	6.0	35.5	11.1	1.9	276	43	2	2	86
	Lemon Tea	90	-	22.5	-	-	-	14	2	2	28
	Fruit Soup	190	-	47.5	-	1.8	36	50	1	1	50
	Soup, Chicken Noodle	77	3.6	9.8	2.6	0.8	637	18	1	1	18
		4355	119.9	618.6	141.8	42.4	4766			18	989
	Coffee, Cream, Sugar & Chewing Gum	60									
		4415									

APPENDIX A

RATION, COLD WEATHER MENU 3

#3 Meal Pack	Calories	Protein (g)	CHO (g)	Fat (g)	Water (g)	Sodium (mg)	Wt. of Indiv. Item(g)	No. of Items	No. of Packets	Total Wt.(g)
Pork & Esc.Pot. Bars	568	34.5	47.5	26.4	1.5	2101	30	4	1	120
Oatmeal (Maple & Br. Sugar)	408	10.0	64.5	5.3	(9.0)	593	101	1	1	101
Granola Bars	396	9.6	56.4	14.8	1.8	180	43	2	1	86
Oatmeal Cookie Bars	464	9.4	64.2	19.0	5.4	384	50	2	1	100
Brownie	270	2.9	27.5	16.5	2.6	69	50	1	1	50
Nut & Raisin Mix	564	11.9	66.5	27.8	1.7	404	56	2	2	112
Fig Bars	206	2.3	41.2	3.7	9.9	256	29	2	1	58
Chocolate Bars	263	7.1	36.6	14.2	0.9	128	28	2	1	56
Caramels	273	3.9	52.2	5.5	5.2	180	11	6	1	68
Orange Beverage Bars	222	0.4	54.6	0.4	0.1	26	28	2	1	56
Cocoa Beverage	380	6.0	35.5	11.1	1.9	276	43	2	2	86
Lemon Tea	90	-	22.5	-	-	-	14	2	2	8
Fruit Soup	190	-	47.5	-	1.8	36	50	1	1	50
Soup, Chicken Noodle	77	3.6	9.8	2.6	0.8	637	18	1	1	18
Coffee, Cream, Sugar & Chewing Gum	4371	101.6	626.5	147.6	42.6	5027			18	989
	60									
	4411									

APPENDIX A

RATION, COLD WEATHER MENU 4

#4 Meal Pack	Calories	Protein (g)	CHO (g)	Fat (g)	Water (g)	Sodium (mg)	Wt. of Indiv. Item (g)	No. of Items	No. of Packets	Total Wt. (g)
Chicken a la King Bars	621	50.9	22.9	36.3	1.7	2624	30	4	1	120
Oatmeal (Apple & Cln.)	348	8.0	55.8	5.3	6.0	471	96	1	1	96
Cranola Bars	396	9.6	56.4	14.8	1.8	180	43	2	1	86
Oatmeal Cookie Bars	464	9.4	64.2	19.0	5.4	384	50	2	1	100
Orange Nut Cake	375	3.8	54.2	15.9	14.8	313	90	1	1	90
Nut & Raisin Mix	564	11.9	66.5	27.8	1.7	404	56	2	2	112
Fig Bars	206	2.3	41.2	3.7	9.9	256	29	2	1	58
Chocolate Bars	263	7.1	36.6	14.2	0.9	128	28	2	1	56
Caramels	273	3.9	52.2	5.5	5.2	180	11	6	1	68
Orange Beverage Bars	222	0.4	54.6	0.4	0.1	26	28	2	1	56
Cocoa Beverage	380	6.0	35.5	11.1	1.9	276	43	2	2	86
Lemon Tea	90	-	22.5	-	-	-	14	2	2	28
Fruit Soup	190	-	47.5	-	1.8	36	50	1	1	50
Soup, Chicken Noodle	77	3.6	9.8	2.6	0.8	637	18	1	1	18
	4469	116.9	619.9	156.6	52.0	5437			18	1024
Coffee, Cream, Sugar & Chewing Gum	60									
	4529									

APPENDIX A

RATION, COLD WEATHER MENU 5

#5 Meal Pack	Calories	Protein (g)	CHO (g)	Fat (g)	Water (g)	Sodium (mg)	Wt. of Indiv. Item (g)	No. of Items	No. of Packets	Total Wt. (g)
Chicken & Rice Bars	596	34.4	36.8	27.9	1.2	2169	30	4	1	120
Oatmeal (Apple & Cin.)	348	8.0	55.8	5.3	6.0	471	96	1	1	96
Granola Bars	396	9.6	56.4	14.8	1.8	180	43	2	1	86
Oatmeal Cookie Bars	464	9.4	64.2	19.0	5.4	384	50	2	1	100
Orange Nut Cake	375	3.8	54.2	15.9	14.8	313	90	1	1	90
Nut & Raisin Mix	564	11.9	66.5	27.8	1.7	404	56	2	2	112
Fig Bars	206	2.3	41.2	3.7	9.9	256	29	2	1	58
Chocolate Bars	263	7.1	36.6	14.2	0.9	128	28	2	1	56
Caramels	273	3.9	52.2	5.5	5.2	180	11	6	1	68
Orange Beverage Bars	222	0.4	54.6	0.4	0.1	26	28	2	1	56
Cocoa Beverage	380	6.0	35.5	11.1	1.9	276	43	2	2	86
Lemon Tea	90	-	22.5	-	-	-	14	2	2	28
Fruit Soup	190	-	47.5	-	1.8	36	50	1	1	50
Soup, Chicken Noodle	77	3.6	9.8	2.6	0.8	637	18	1	1	18
	4444	100.4	633.8	148.2	51.5	5677			18	1024
Coffee, Cream, Sugar & Chewing Gum	60									
	4504									

APPENDIX A

RATION, COLD WEATHER MENU 6

#6	Meal Pack	Calories	Protein (g)	CHO (g)	Fat (g)	Water (g)	Sodium (mg)	Mt. of Indiv. Item (g)	No. of Items	No. of Packets	Total Weight (g)
	Spaghetti w/Meat Sauce Bars	587	38.4	48.3	26.7	1.7	1831	30	4	1	120
	Oatmeal (Maple & Br. Sugar)	408	10.0	64.5	5.3	(9.0)	593	101	1	1	101
	Granola Bars	396	9.6	56.4	14.8	1.8	180	43	2	1	86
	Oatmeal Cookie Bars	464	9.4	64.2	19.0	5.4	384	50	2	1	100
	Brownie	270	2.9	27.5	16.5	2.6	69	50	1	1	50
	Nut & Raisin Mix	564	11.9	66.5	27.8	1.7	404	56	2	2	112
	Fig Bar	206	2.3	41.2	3.7	9.9	256	29	2	1	58
	Chocolate Bars	263	7.1	36.6	14.2	0.9	128	28	2	1	56
	Caramels	273	3.9	52.2	5.5	5.2	180	11	6	1	68
	Orange Beverage Bars	222	0.4	54.6	0.4	0.1	26	28	2	1	56
	Cocoa Beverage	380	6.0	35.5	11.1	1.9	276	43	2	2	86
	Lemon Tea	90	-	22.5	-	-	-	14	2	2	28
	Fruit Soup	190	-	47.5	-	1.8	36	50	1	1	50
	Soup, Chicken Noodle	77	3.6	9.8	2.6	0.8	637	18	1	1	18
		4390	105.5	627.3	147.6	42.8	3710			18	989
	Coffee, Cream, Sugar & Chewing Gum	60									
		4450									

APPENDIX B

Young's Questionnaires:

Individual Item Evaluation

Evaluation Sheet/Arctic Ration

APPENDIX B

INDIVIDUAL ITEM EVALUATION:

Items should be evaluated for taste, quality, quantity and usefulness.
Follow each rating with a supporting statement and comments.

Apple and Cinnamon Oatmeal	1	2	3	4	5
Maple and Brown Sugar Oatmeal	1	2	3	4	5
Orange Nut Cake	1	2	3	4	5
Brownie	1	2	3	4	5
Orange Beverage Bars	1	2	3	4	5
Cocoa	1	2	3	4	5
Tea	1	2	3	4	5
Chicken Noodle Soup	1	2	3	4	5
Strawberry Fruit Soup	1	2	3	4	5
Raspberry Fruit Soup	1	2	3	4	5
Granola Bars	1	2	3	4	5
Oatmeal Cookie Bars	1	2	3	4	5
Raisinut Crunch	1	2	3	4	5
Caramels	1	2	3	4	5
Chocolate Bars	1	2	3	4	5
Fig Bars	1	2	3	4	5
ACCESSORY PACKET	1	2	3	4	5

THINGS I WOULD ADD, CHANGE OR DELETE. (Please be specific):

EVALUATION SHEET/ARCTIC RATION:

DATE:

NAME OF MAIN MEAL:

MENU NO.:

PHYSICAL ACTIVITY PERFORMED THIS DAY:

OTHER INFORMATION PERTINENT TO EVALUATION:

OVERALL EVALUATION:

The following questions are designed to evaluate the meal as a whole.

Circle the appropriate number of each item 1 thru 5. Rate to the following scale:

- 1 - Unnecessary/Not acceptable
- 2 - Inadequate/Poor
- 3 - Average/Sufficient
- 4 - Good/Above Average
- 5 - Excellent/Ideal

Follow each rating with a supporting statement.

CALORIE CONTENT	1	2	3	4	5
Were you cold?					
Did you become cold?					
PACKAGING	1	2	3	4	5
Necessary?					
Weight?					
TASTE	1	2	3	4	5
Actual taste?					
Visual appeal?					
QUALITY	1	2	3	4	5
Garbage or Gourmet?					
QUANTITY	1	2	3	4	5
Did you have enough to eat?					
Did you have enough to drink?					

OVERALL EVALUATION

1 2 3 4 5

Favorable Comments:

Unfavorable Comments:

MAIN MEAL EVALUATION

1 2 3 4 5

THINGS I WOULD ADD, CHANGE OR DELETE.

APPENDIX C

Ration, Cold Weather (Arctic Ration) Questionnaire

APPENDIX C

DAY TWO

ARCTIC RATION QUESTIONNAIRE

U.S. Army Natick Research & Development Center
Natick, Massachusetts 01760

During the past several days you were fed a new ration. We are interested in your honest reactions to these foods. Your responses to these questions are important to the future development of this ration and are strictly confidential.

1. How long have you been in the Armed Forces? _____ years, _____ months
2. What is your rank? _____
3. Please use the following scale to indicate how much you like or dislike each of the items in the Arctic Ration by marking the number that best expresses your opinion. If you never tried a particular item, please mark the "NEVER TRIED" category and leave the rating scale blank.

NEVER TRIED	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY					
0	1	2	3	4	5	6	7	8	9					
a.	Orange nutcake				0	1	2	3	4	5	6	7	8	9
b.	Cocoa beverage				0	1	2	3	4	5	6	7	8	9
c.	Beef and vegetable bars				0	1	2	3	4	5	6	7	8	9
d.	Nut and raisin mix				0	1	2	3	4	5	6	7	8	9
e.	Oatmeal with apple & cinnamon				0	1	2	3	4	5	6	7	8	9
f.	Chicken stew bar				0	1	2	3	4	5	6	7	8	9
g.	Orange beverage bar				0	1	2	3	4	5	6	7	8	9
h.	Raspberry fruit soup				0	1	2	3	4	5	6	7	8	9
i.	Chicken and rice bar				0	1	2	3	4	5	6	7	8	9
j.	Chocolate bar with toffee				0	1	2	3	4	5	6	7	8	9
k.	Oatmeal cookie bar				0	1	2	3	4	5	6	7	8	9
l.	Pork and escalloped potato bar				0	1	2	3	4	5	6	7	8	9
m.	Oatmeal with maple and brown sugar				0	1	2	3	4	5	6	7	8	9
n.	Chicken noodle soup				0	1	2	3	4	5	6	7	8	9
o.	Caramels				0	1	2	3	4	5	6	7	8	9
p.	Spaghetti with meat sauce bars				0	1	2	3	4	5	6	7	8	9
q.	Granola bars				0	1	2	3	4	5	6	7	8	9
r.	Lemon tea				0	1	2	3	4	5	6	7	8	9
s.	Fig bar				0	1	2	3	4	5	6	7	8	9
t.	Strawberry Fruit Soup				0	1	2	3	4	5	6	7	8	9
u.	Brownie				0	1	2	3	4	5	6	7	8	9
v.	Chicken A La King bar				0	1	2	3	4	5	6	7	8	9
w.	Apricot Fruit Soup				0	1	2	3	4	5	6	7	8	9

APPENDIX C

4. Please rate how much you like or dislike eating the Arctic Ration for breakfast, lunch and dinner. Circle one number for each of the three meals.

DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SOMEWHAT	NEITHER LIKE NOR DISLIKE	LIKE SOMEWHAT	LIKE MODERATELY	LIKE VERY MUCH
1	2	3	4	5	6	7

- | | | | | | | | |
|------------------|---|---|---|---|---|---|---|
| a. For breakfast | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. For lunch | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. For dinner | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. When did you eat? Circle one number.

- 1 - At designated meal times
- 2 - Throughout the day, as time permitted
- 3 - Both of the above

6. Overall, did you get enough to eat or were you often hungry? Circle one number.

- 1 - Got enough to eat
- 2 - Was often hungry

7. Please rate how satisfied or dissatisfied you were with each of the following aspects of the Arctic Ration you ate. Circle one number for each aspect.

VERY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEITHER SATISFIED NOR DISSATISFIED	SOMEWHAT SATISFIED	MODERATELY SATISFIED	VERY SATISFIED
1	2	3	4	5	6	7

- | | | | | | | | |
|--|---|---|---|---|---|---|---|
| a. How easy the ration is to prepare | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. How the food tastes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. How the food looks | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. How much food there is in one meal pack | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. How much variety there is within a meal pack | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| f. How much variety there is from meal pack to meal pack | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

APPENDIX C

8. We would like to know what you think of the amount of food provided by each part of the Arctic Ration. Was there too little, too much or just about the right amount? Please circle one number for each part of the ration.

AMOUNT MUCH TOO SMALL	AMOUNT MODERATELY TOO SMALL	AMOUNT SOMEWHAT TOO SMALL	AMOUNT JUST RIGHT	AMOUNT SOMEWHAT TOO LARGE	AMOUNT MODERATELY TOO LARGE	AMOUNT MUCH TOO LARGE
1	2	3	4	5	6	7

- | | | | | | | | |
|------------------------|---|---|---|---|---|---|---|
| a. Entree bars | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Breakfast (oatmeal) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Candies and cakes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Beverages and soups | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

9. We would like to know how satisfied you were with the variety in each part of the Arctic Ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

VARIETY NOW ENOUGH	SHOULD BE SOMEWHAT MORE VARIETY	SHOULD BE MODERATELY MORE VARIETY	SHOULD BE MUCH MUCH VARIETY
1	2	3	4

- | | | | | |
|------------------------|---|---|---|---|
| a. Entree bars | 1 | 2 | 3 | 4 |
| b. Breakfast (oatmeal) | 1 | 2 | 3 | 4 |
| c. Candies and cakes | 1 | 2 | 3 | 4 |
| d. Beverages and soups | 1 | 2 | 3 | 4 |

10. a. Were you able to get enough water to rehydrate the food items that you wanted to rehydrate? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

- b. Were you able to get enough water to satisfy your thirst? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

- c. How difficult was it to obtain water? Please circle one number.

VERY EASY	MODERATELY EASY	SLIGHTLY EASY	NEUTRAL	SLIGHTLY HARD	MODERATELY HARD	VERY HARD
1	2	3	4	5	6	7

APPENDIX C

11. On the average, how many CANTEENS (one canteen = 32 ounces or one quart) of water did you use each day for drinking and eating?

Number of
canteens (Circle one): 1 2 3 4 5 6

12. On the average, how many canteen CUPS (one canteen cup = 16 ounces) of water did you use each day for drinking and eating?

Number of
cups (Circle one): 1 2 3 4 5 6 7 8 9 10 11 12

13. How many times did you have to melt snow or ice in order to obtain water? Please circle one number.

NEVER	ONE TO FOUR TIMES	ONCE EACH DAY	TWICE EACH DAY	THREE TIMES EACH DAY	FOUR TIMES EACH DAY	FIVE OR MORE TIMES EACH DAY
1	2	3	4	5	6	7

14. If you melted snow or ice, did you melt it in a canteen cup or in a larger vessel? Please circle one number

CANTEEN CUP	LARGER VESSEL	DID NOT MELT SNOW
1	2	3

15. Overall, how CONVENIENT was the Arctic Ration to use in the field? Please circle one number.

EXTREMELY CONVENIENT	MODERATELY CONVENIENT	SLIGHTLY CONVENIENT	NEUTRAL	SLIGHTLY INCONVENIENT	MODERATELY INCONVENIENT	EXTREMELY INCONVENIENT
1	2	3	4	5	6	7

16. In comparison with the MCI (Meal, Combat Individual), if you have ever carried it into the field, how CONVENIENT was the Arctic Ration to use in the field? Please circle one number.

MUCH MORE	SOMEWHAT MORE	SLIGHTLY MORE	NEUTRAL	SLIGHTLY LESS	SOMEWHAT LESS	MUCH LESS
1	2	3	4	5	6	7

17. In comparison to the MCI (Meal, Combat Individual), if you have ever carried it into the field, how much better or worse was the QUALITY of the Arctic Ration? Please circle one number.

MUCH BETTER	SOMEWHAT BETTER	SLIGHTLY BETTER	NEUTRAL	SLIGHTLY WORSE	SOMEWHAT WORSE	MUCH WORSE
1	2	3	4	5	6	7

APPENDIX C

18. Below is a list of possible ways of improving the Arctic Ration. Please write the number "1" next to the improvement you think is MOST important, the number "2" next to the improvement you think is SECOND in importance, the number "3" next to the improvement you think is THIRD in importance, the number "4" next to what is FOURTH, and the number "5" next to what is FIFTH. Do not mark an item if you do not think it will improve the ARCTIC RATION.

- _____ Make the rations taste better
- _____ Increase the variety in the rations
- _____ Make the rations easier to prepare
- _____ Include more breakfast foods in the ration
- _____ Make the portion sizes larger

19. Do you have any other comments on the Arctic Ration?